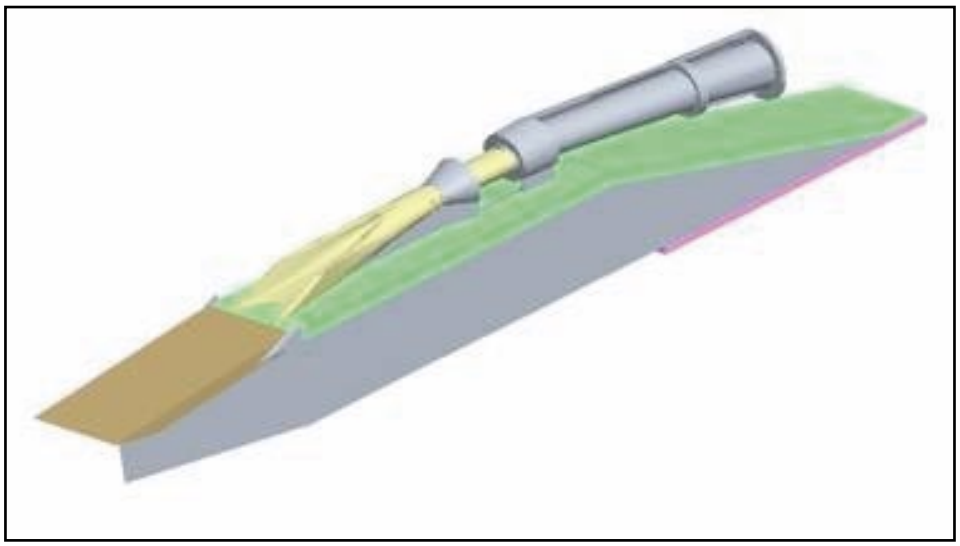
Air Force Research Laboratory|AFRL
Science and Technology for Tomorrow's Air and Space Force

Success Story

ELLIPTICAL COMBUSTOR BENEFITS SCRAMJET PERFORMANCE



AFRL engineers completed a study on the elliptical combustor supersonic combustion ramjet (scramjet), which provides performance benefits over conventional rectangular scramjet engines for cruise missile applications and hypersonic reconnaissance and strike aircraft. The study determined integrated performance of the elliptical combustor scramjet (ECS) after its integration into a baseline missile airframe. The study team applied and modified design tools to make performance and operability enhancements to the existing ECS flow path for low-Mach-number and on-design operation.

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Accomplishment

Engineers performed the study, entitled "Elliptical Combustor," under AFRL's Robust Scramjet program. In the study, they modified a National Aeronautics and Space Administration hydrogen-fueled, nonrectangular scramjet design to operate on a hydrocarbon fuel. AFRL integrated the engine into a hypersonic missile airframe to determine performance of the integrated engine/vehicle design. This effort evaluated the viability of the integrated nonrectangular hypersonic air-breathing propulsion system, or the ECS.

Background

AFRL's high-speed program demonstrates the operability, performance, and structural durability of liquid hydrocarbon scramjets. The near-term application of this technology is a long-range hypersonic cruise missile that is logistically supportable in a combat environment and can defeat time-sensitive targets, as well as hard and deeply buried targets. Eventually, the scramjet technology will enable a Mach 8-10 strike/reconnaissance aircraft and affordable, on-demand space access with aircraft-like operations.

Propulsion
Emerging Technologies

Additional Information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (05-PR-12)